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datum inc.

Timing Instrumentation

INSTRUCTION MANUAL

MODEL 9520

TIME DISPLAY

PART NUMBER 9520-100

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SECTION I

GENERAL DESCRIPTION AND SPECIFICATIONS

1.1 GENERAL

The DATUM Model 9520 accepts as its input a serial time code. This time code is decoded and re-formatted into parallel Binary Coded Decimal (BCD) information. This information is used to drive a visual display for interface to the user and is buffered and provided as parallel outputs to drive additional user equipment.

1.2 PHYSICAL

The DATUM Model 9520 is constructed in a 1-3/4 inch package. The unit is designed for mounting in a standard 19-inch equipment rack. The circuitry of the Model 9520 consists of TTL-type integrated circuits and other solid-state components throughout.

1.3 SPECIFICATIONS (See note on Page 1-3)

1.3.1 Inputs

J1 - AC Power

a. Voltage: 115/230V AC $\pm$10%, $\leq$ 40 Watts

NOTE: The instrument is wired for connection to 115V AC power. (See Section III for conversion to 220V AC operation.)

b. Frequency: 50 ~ 400 Hz

NOTE: Units wired for 220V AC will be identified as "220 VAC" at AC power connector.

J3 - IRIG TIME CODE

a.	Format:	IRIG Format A, B or E per IRIG Document 104-70 (See Note)
b.	Configuration:	Amplitude modulated carrier
c.	Carrier Frequency:	As specified
d.	Modulation Ratio:	2:1 to 100%
e.	Amplitude:	0.8 to 10 volts peak-to-peak on the "mark" amplitude
f.	Input Impedance	Approximately 10K ohms at 1 kHz (XFMR INPUT)

NOTE: This unit can be configured to accept the following code formats: (See Section V for Code Format Drawings.)

a. IRIG A (A132) 10 kHz
b. IRIG B (B122) 1 kHz
c. IRIG E (E112) 100 Hz

1.3.2 OUTPUTS

J2 - Parallel Outputs

30-bits BCD, representing time of year in seconds, minutes, hours, and days.

a.	Levels:	Logic "0" $\leq$ 0.4 VDC Logic "1" $\geq$ 2.4 VDC
b.	Output Impedance:	TTL/DTL Compatible

1.3.3 Visual Display (LED) — Nine-digit 0.4" character height display, representing time-of-year in seconds, minutes, hours, and days. (Or optional 0.6" LED display)

1.3.4 Environment

a. Temperature: 0 to 50°C

b. Humidity: 0 to 95% relative

NOTE: The specifications, connectors, and pin assignments listed in this section pertain to the Basic instrument and to certain Basic options. Any variation from these specifications, a list of options installed and option descriptions which are not covered in this section will be found in the front of this manual immediately following the title page.

SECTION II

INSTALLATION

1. Locate the equipment in the desired mounting rack.

2. Connect J1 to a source of AC power, using the power cord supplied with the instrument. Refer to Section I for specifications.

3. Connect the appropriate IRIG input signal to J3. Refer to Section I for specifications. Refer to Table I for pin assignments.

4. Connect J2 (parallel outputs) as required. Refer to Table II for pin assignments.

TABLE I

PIN ASSIGNMENTS
CODE INPUT
(Connector J3)

PIN	SIGNAL	REMARKS
1	Input High	XFMR Input
2	Input Low	XFMR Input
3	600 Ohm Terminator	Connect to Pin 2 for XFMR termination
4	* Single-Ended Input	Capacitive coupled input
5	Chassis GND	
6	Signal GND	

* OPTIONAL INPUT.not normally installed.

TABLE II

PIN ASSIGNMENTS
PARALLEL OUTPUTS

J2 Pin	Term	J2 Pin	Term
1	GROUND	23	UHC1
2	GROUND	24	UHC2
3	USC1	25	UHC4
4	USC2	26	UHC8
5	USC4	27	THC1
6	USC8	28	THC2
7	TSC1	29	GROUND
8	TSC2	30	GROUND
9	TSC4	31	UDC1
10	GROUND	32	UDC2
11	UMC1	33	UDC4
12	UMC2	34	UDC8
13	UMC4	35	TDC1
14	UMC8	36	TDC2
15	TMC1	37	TDC4
16	TMC2	38	TDC8
17	TMC4	39	HDC1
18	GROUND	40	HDC2
19	NOT USED	41	GROUND
20	NOT USED	42	GROUND
21	NOT USED	43	GROUND
22	NOT USED	44-50	NOT USED

SECTION III

OPERATION

3.1 CONTROLS AND ADJUSTMENTS

3.1.1 Although there are no adjustments to be made in the Model 9520, the the power transformer can be configured to operate from either 115V AC or 230V AC.

To convert the Model 9520 power operation from 115V AC to 230V AC, remove the jumper between E77 and E79 and place the jumper between E77 and E78.

3.2 OPERATING PROCEDURES

3.2.1 Apply AC power to the unit.

3.2.2 Apply the appropriate serial input code to the unit.

3.2.3 The Model 9520 is now operational.

SECTION IV

LOGIC DESCRIPTION AND USE

The 9520 logic is depicted by several drawings. One of these is the top assembly drawing which shows the physical location of the assemblies that are contained within the instrument. This print should be used to locate connectors on the rear panel and for quick reference to the physical location of any of the assemblies or controls.

In the title block of each logic print is a circled number, such as (1), (2), etc. This circled number is the term reference number. Except for terms originating within the drawing being studied, this term reference number will precede each term, showing the sheet of logic upon which it originated. To use these numbers, simply observe the term, look at the term reference number preceding the term, then select the print that has this term reference number in the title block. This print will show the point of origin of the term you are trying to find. This provides a convenient means of getting back and forth from various pages of these logics.

In each of the logics there will be a number such as U1, U2, U3, etc. This number refers to the physical location on this assembly for that particular integrated-circuit element. In order to determine the physical location of an integrated circuit, one would merely refer to the top assembly drawing.

SECTION V

THEORY OF OPERATION

All references in this discussion will be based on the term reference numbers located in the title blocks of all logic prints. The reader should familiarize himself with Section IV, Logic Description and Use, before proceeding.

AGC & DECODER (1)

The AGC accepts the input code and normalizes it to a level of approximately four volts peak-to-peak, as measured at U81, pin 6. The AGC amplifier is comprised of operational amplifier U81. The output of this amplifier is compared with a reference voltage of approximately -2 volts at U82, pin 3. The error voltage output is integrated and used to control the gate of FET Q1, which controls the input level to the AGC amplifier.

The AGC amplifier output is applied to the code stripper, which is comprised of one-half of voltage comparator U80. The reference voltage is approximately -1.5 volts. When the "mark" amplitude of the AGC output exceeds this level, a pulse is generated at the output of U80, pin 12. This pulse ($\overline{\text{DC}}$) is normally at +5 volts and goes to ground once for each carrier cycle contained within the "mark" amplitude of the input code. No pulses are generated during the "space" amplitude portion of the input code.

The AGC input is sampled by a threshold detector comprised of the second half of U80 and activity sensor U64. As long as the input code is present, U80 outputs a series of pulses which are applied as clock to the activity sensor one-shot, TN. TN is set for a time of approximately 1-1/2 times the pulse period of the input code, therefore is not allowed to "time-out" as long as the input code is present.

The decoder uses $\overline{\text{ØC}}$ and carrier-rate clocks (ØA, ØB) to reconstruct the DC envelope of the input code. DF1 is a series of positive-going pulses, one for each carrier cycle contained within the "mark" amplitude of the input code, essentially the inverse of $\overline{\text{ØC}}$. $\overline{\text{DF1}}$ generates a sync pulse (MS) which synchronizes all counters on the Minor Time Counter (3) which have cycle periods equal to or less than the carrier rate of the input code.

DF3 is the reconstructed DC envelope of the input code, delayed by two carrier cycles from the "on-time" point of the input code and is used to determine binary one data and position identifiers contained within the input code.

DF3 enables binary counter U83 which counts the number of DF1 cycles contained in each DF3 pulse. Since two carrier cycles are required to clock DF3 "true", the "false" condition of DF3 presets the divide-by-eight portion of U83 to a count of two. To recognize a binary one, two additional DF1 pulses, plus the two which were required to clock DF3 true, must occur. This will cause the term BIN 1 to clock true.

If five DF1 pulses occur within the DF3 pulse, U83 pins 9, 2 and 12 all become true, enabling DF1 to clock the divide-by-two portion of U83. The sixth DF1 pulse clocks the term PIC (Positive Identifier Clock) true. This occurs on the eighth DF1 pulse contained within a pulse period and indicates detection of a position identifier in the input code. When PIC is true at the time DF3 is clocked false, flip-flop PID (Position Identifier Detector) clocks true. This occurs ten times per frame in the IRIG format.

SCAN LOGIC (2)

This logic converts the serial binary information (BIN 1) from (1) into parallel form by means of a ten-bit shift register U28, which reflects the status of BIN 1 at the time DF3 clocks off.

Assignment of the shift register outputs to the proper position in the Major Time Counter (4) is accomplished by decimal counter U26 and four-to-ten line converter U27. U26 counts position identifiers and is set to zero by the gating structure at U49, pin 6. This occurs once-per-frame, essentially "on-time" with the input code. The outputs of U26 are decoded into ten sequential pulses, width limited by the ten-pulses-per-frame rate of DSP. The outputs of U27 are used to strobe the shift register outputs into the appropriate storage elements on (4).

Each time counter U26 recycles, it generates a one-pulse-per-frame synchronization pulse (FS) which synchronizes the remaining counters of the Minor Time Counter (3).

MINOR TIME COUNTER (3)

This logic consists of a 100 kHz oscillator and five decade counters which produce negative (ØA) and positive (ØB) edge on-time carrier-rate clocks for the decoder (1). The final divider (U48, pin 12) provides a 1 pps clock to pre-date the Major Time Counter (4).

The counters which have a cycle period equal to or less than the carrier rate are synchronized by $\overline{MS}$ from (1). The remaining counters are synchronized by $\overline{FS}$ from (2). If the unit is programmed for IRIG A operation (refer to Input Specifications), the tenths-of-seconds information from the input code is strobed into U48 by the term $\overline{LDC2}$ from (2).

MAJOR TIME COUNTER (4)

This logic consists of a series of divide-by-ten and divide-by-six counters connected to permute the 1 pps update pulse (tsc8) from (3) into seconds, minutes and hours time-of-day and into days time-of-year. The hours counters U31 and U32 are reset once per day by one-shot RHC (Reset Hours Counters) U25, which is clocked by a decoded count of twenty-four hours. RHC is additionally used to update the days counters.

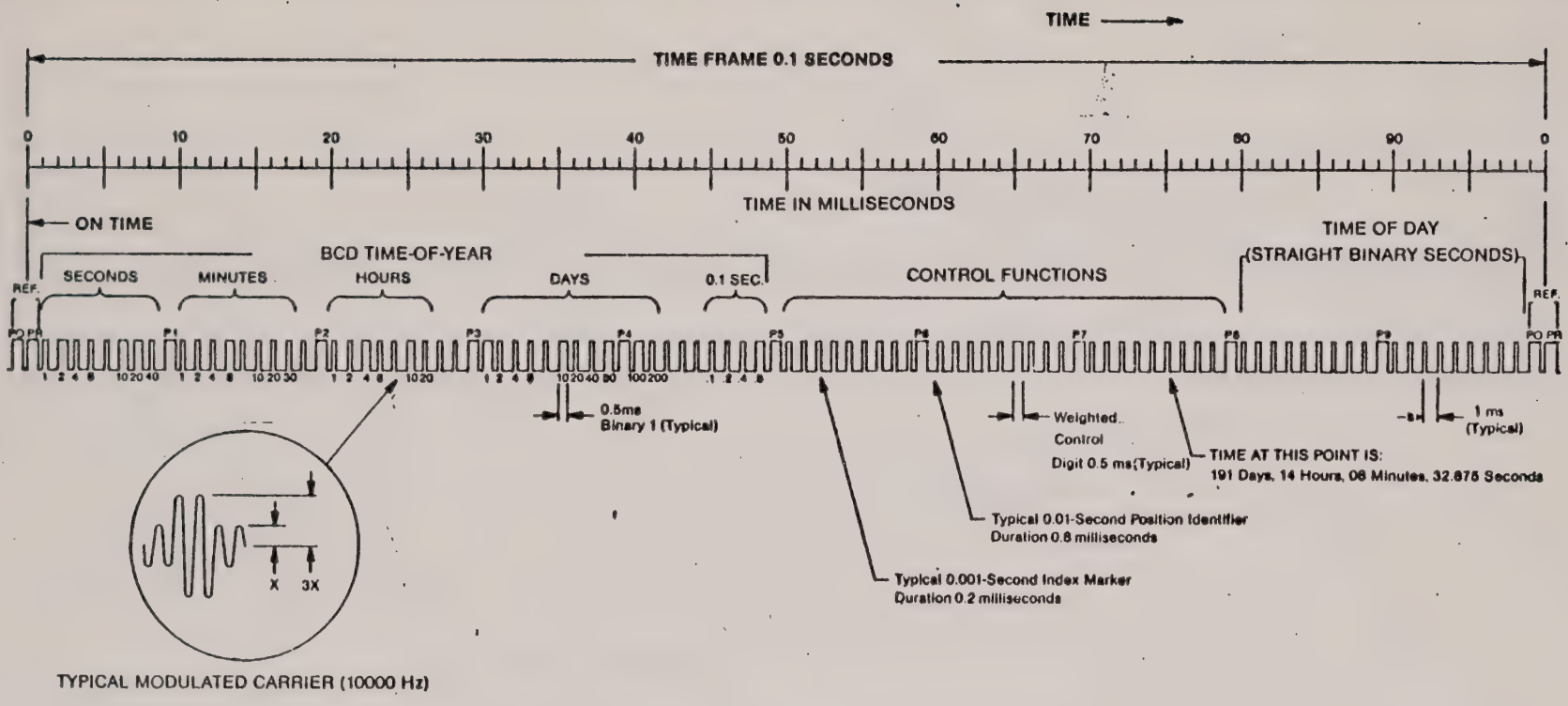
The Major Time Counter is initially preset with the contents of the input code with the strobe pulses $\overline{\text{LSC}}$ through $\overline{\text{LDC2}}$ from the scan logic (2). If the unit is programmed for IRIG E operation, the Unit Seconds Counter U54 serves as an additional decade of the Time Base Logic (3), and is reset once per frame by the frame sync pulse.

DISPLAY DRIVERS (5) (6) (7)

This logic converts the data to be displayed from a four-line BCD format to the seven-segment format required by the display elements. Additionally, this logic provides buffering for the time-of-year parallel outputs.

POWER SUPPLY (8)

This is a linear type power supply which supplies ±8V DC (unregulated) from which the unit's operating voltages are derived. The +8 volts is used to develop the regulated +5 volts (Regulators U84, U85, U86), and the -8 volts to develop the -5 volts (nominally -5.6 volts).



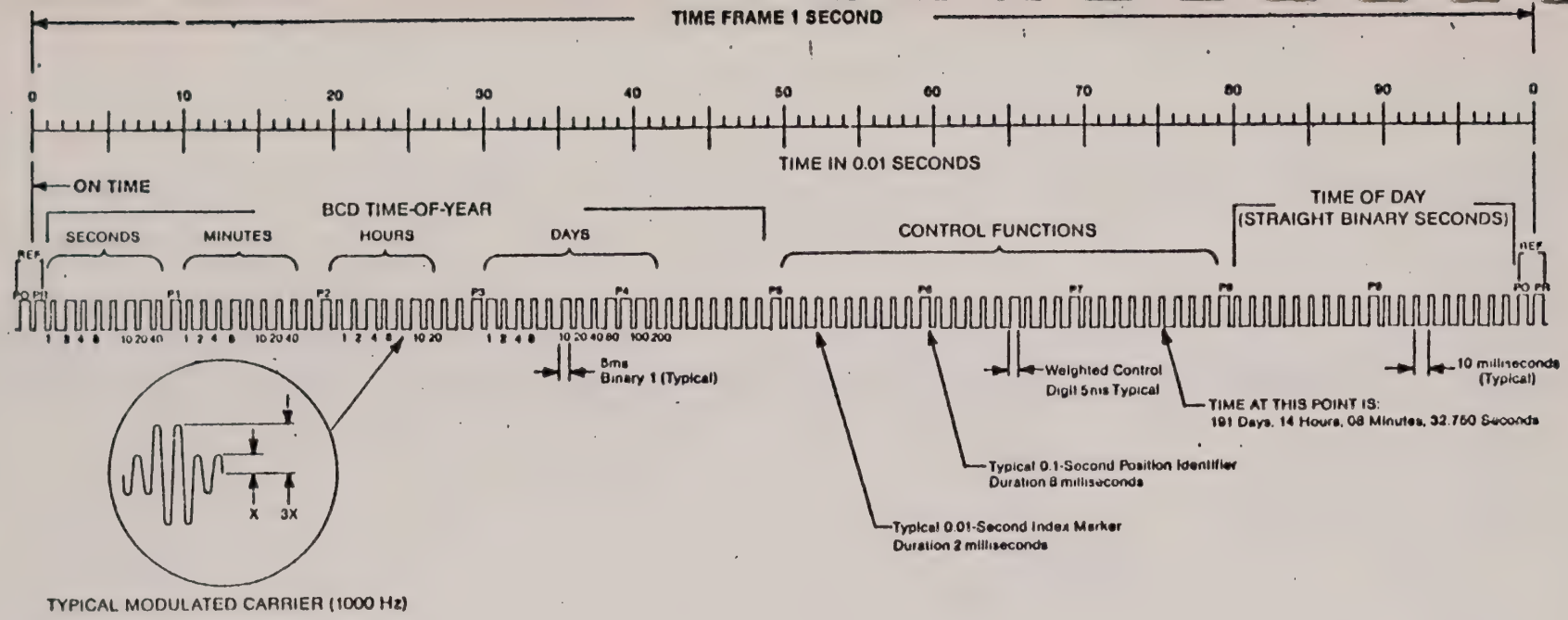
TYPICAL MODULATED CARRIER (10000 Hz)

IRIG FORMAT 'A' – GENERAL

1. **TIME FRAME:** 0.1 second
2. **CODE DIGIT WEIGHTING OPTIONS:** BCD, SB or both:
   a. Binary Coded Decimal Time-of-Year CODE WORD — 34 binary digits.
      (1) Seconds, minutes, hours, days and 0.1 seconds. Recycles yearly.
   b. Straight Binary Time-of-Day CODE WORD — 17 binary digits.
      (1) Seconds only. Recycles each 24 hours. (86399)
3. **CODE WORD STRUCTURE:**
   a. BCD. Word begins at INDEX COUNT 1. Binary-coded elements occur between POSITION IDENTIFIER ELEMENTS (seven for seconds; seven for minutes; six for hours; ten for days; four for 0.1 seconds) until the CODE WORD is complete. A POSITION IDENTIFIER occurs between decimal digits in each group to provide separation for visual resolution.
   b. SB. Word begins at INDEX COUNT 80. Seventeen binary-coded elements occur, with a POSITION IDENTIFIER between the 9th and 10th binary-coded elements.
4. **LEAST SIGNIFICANT DIGIT:** Occurs first, except for fractional seconds information, which occurs following the day-of-year information.
5. **ELEMENT RATES AVAILABLE:**
   a. 1000 per second (basic Element rate)
   b. 100 per second (POSITION IDENTIFIER rate)
   c. 10 per second (Frame rate)
6. **ELEMENT IDENTIFICATION:**
   a. "On-Time" reference point for each Element is its leading edge.
   b. INDEX MARKER duration: 0.2 milliseconds (Binary Zero or uncoded Element)
   c. CODE DIGIT duration: 0.5 milliseconds (Binary one)
   d. POSITION IDENTIFIER: 0.8 milliseconds
   e. REFERENCE MARKER: Two consecutive POSITION IDENTIFIERS.

   (The "on-time" point, to which the CODE WORD refers, is the leading edge of the second POSITION IDENTIFIER.)
7. **RESOLUTION:** 1 millisecond (unmodulated); 0.1 millisecond (modulated).
8. **CARRIER FREQUENCY:** 10 kHz when modulated.

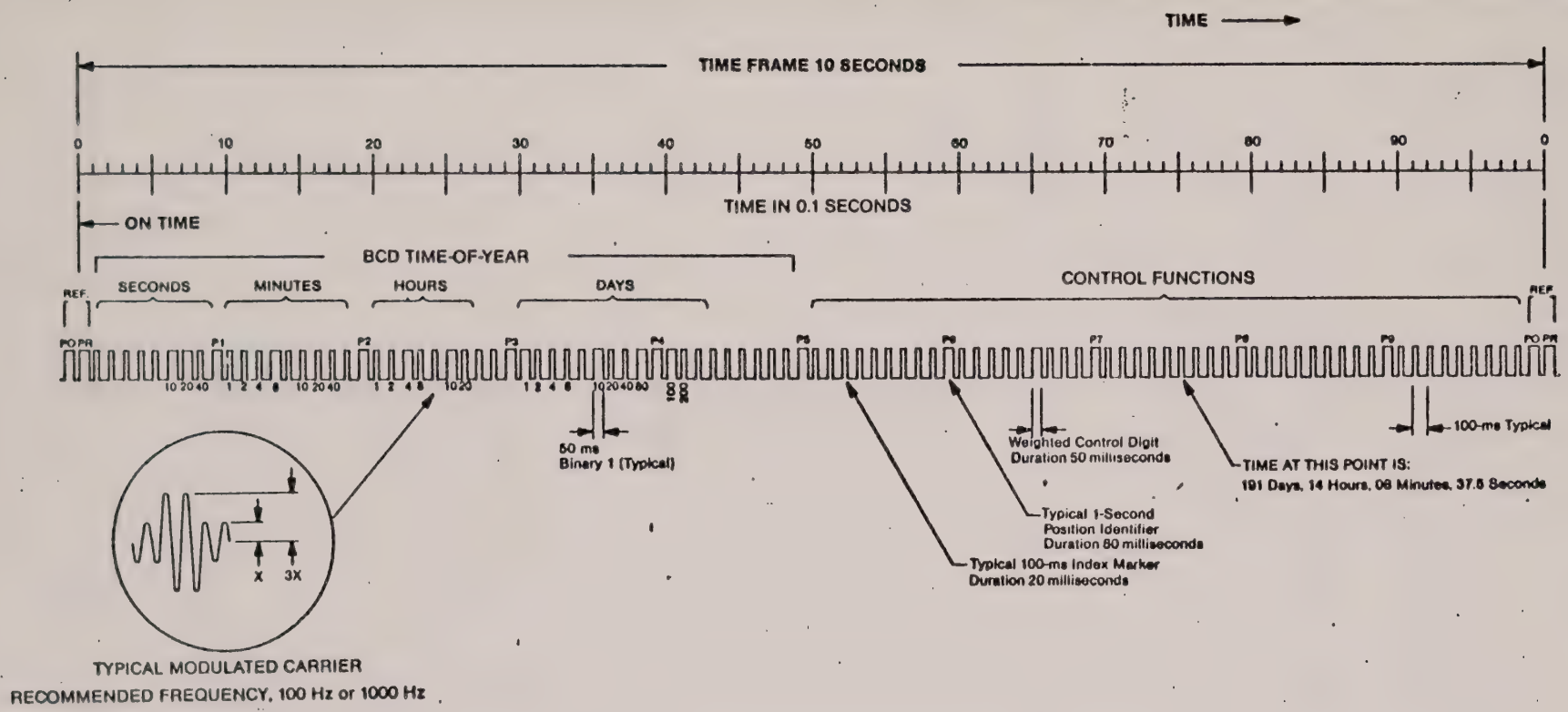
IRIG STANDARD FORMAT A
SIGNAL A00
1000 PPS CODE
REFERENCE IRIG DOCUMENT 104-70



IRIG FORMAT 'B' — GENERAL

1. **TIME FRAME:** 1.0 second.
2. **CODE DIGIT WEIGHTING OPTIONS:** BCD, SB or both:
   a. Binary Coded Decimal Time-of-Year CODE WORD — 30 binary digits.
      (1) Seconds, minutes, hours and days. Recycles yearly.
   b Straight Binary Time-of-Day CODE WORD — 17 binary digits.
      (1) Seconds only. Recycles each 24 hours. (86399)
3. **CODE WORD STRUCTURE:**
   a. BCD: Word begins at INDEX COUNT 1. Binary-coded elements occur between POSITION IDENTIFIER ELEMENTS (seven for seconds, seven for minutes; six for hours; ten for days) until the CODE WORD is complete. A POSITION IDENTIFIER occurs between decimal digits in each group to provide separation for visual resolution.
   b. SB: Word begins at INDEX COUNT 80. Seventeen binary-coded elements occur with a POSITION IDENTIFIER between the 9th and 10th binary-coded elements.
4. **LEAST SIGNIFICANT DIGIT:** occurs first.
5. **ELEMENT RATES AVAILABLE:**
   a. 100 per second (basic Element rate)
   b. 10 per second (POSITIVE IDENTIFIER Rate)
   c. 1 per second (Frame Rate)
6. **ELEMENT IDENTIFICATION:**
   a. "On-Time" reference point for each Element is its leading edge.
   b. INDEX MARKER duration: 2 milliseconds (Binary zero or uncoded Element)
   c. CODE DIGIT duration: 5 milliseconds (Binary one)
   d. POSITION IDENTIFIER duration: 8 milliseconds
   e. REFERENCE MARKER — one per second: Two consecutive POSITION IDENTIFIERS.
      (The "On-Time" point, to which the CODE WORD refers, is the leading edge of the second POSITION IDENTIFIER.)
7. **RESOLUTION:** 10 milliseconds (unmodulated); 1 millisecond (modulated).
8. **CARRIER FREQUENCY:** 1 kHz when modulated.

IRIG STANDARD FORMAT B
SIGNAL B00
100 PPS CODE
REFERENCE IRIG DOCUMENT 104-7



TYPICAL MODULATED CARRIER

RECOMMENDED FREQUENCY, 100 Hz or 1000 Hz

IRIG FORMAT 'E' — GENERAL

1. **TIME FRAME:** 10 seconds
2. **CODE DIGIT WEIGHTING:** BCD: Time-of-Year CODE WORD — 26 Binary Digits. Seconds, minutes, hours and days; recycles yearly.
3. **CODE WORD STRUCTURE:**
   BCD: Word begins at INDEX COUNT 6. Binary-coded Elements occur between POSITION IDENTIFIER ELEMENTS (three for seconds, seven for minutes; six for hours, ten for days) until the CODE WORD is complete. A POSITION IDENTIFIER occurs between decimal digits in each group to provide separation for visual resolution.
4. **LEAST SIGNIFICANT DIGIT:** Occurs first.
5. **ELEMENT RATES AVAILABLE:**
   a. 10 per second (basic Element rate)
   b. 1 per second (POSITION IDENTIFIER Rate)
   c. 0.1 per second (Frame Rate)
6. **ELEMENT IDENTIFICATION:**
   a. "On-Time" reference point for each Element is its leading edge.
   b. INDEX MARKER duration: 20 milliseconds (Binary zero or uncoded Element)
   c. CODE DIGIT duration: 50 milliseconds (Binary one)
   d. POSITION IDENTIFIER duration: 80 milliseconds (Refers to the leading edge of the succeeding Element).
   e. REFERENCE MARKER (one per 10 seconds): Two consecutive POSITION IDENTIFIERS.

   (The "On-Time" point, to which the CODE WORD refers, is the leading edge of the second POSITION IDENTIFIER.)
7. **RESOLUTION:** 100 milliseconds (unmodulated); 1 millisecond (modulated).
8. **CARRIER FREQUENCY:** 1 kHz or 100 Hz when

IRIG STANDARD FORMAT E
SIGNAL E00
10 PPS CODE

SECTION VI

GLOSSARY OF TERMS

The following is a glossary of the logic terms contained within the Model 9520 along with a brief definition of that term. An overscored term indicates either the false state of a term or, as in the case of strobe pulses or control position, the logic state at which the indicated function is performed.

Reference Number	Term Name	Definition
(1)	BIN "1"	Recovered Binary "one" data
(1)	DF1/$\overline{\text{DF1}}$	Decoder Flip-Flop 1
(1)	DF2/$\overline{\text{DF2}}$	Decoder Flip-flop 2
(1)	DF3/$\overline{\text{DF3}}$	Decoder Flip-flop 3
(1)	MS/$\overline{\text{MS}}$	Mark Sync
(1)	PIC	Position Identifier Clock
(1)	PID/$\overline{\text{PID}}$	Position Identifier Detector
(1)	TN/$\overline{\text{TN}}$	Threshold Normal
(1)	$\overline{\text{ØC}}$	Code Stripper Output
(2)	DSD/$\overline{\text{DSD}}$	Data Strobe Delay
(2)	DSP/$\overline{\text{DSP}}$	Data Strobe Pulse
(2)	FS/$\overline{\text{FS}}$	Frame Sync
(2)	$\overline{\text{LSC}}$	Load Seconds Counter
(2)	$\overline{\text{LMC}}$	Load Minutes Counter
(2)	$\overline{\text{LHC}}$	Load Hours Counter

Reference Number	Term Name	Definition
(2)	$\overline{\text{LDC1}}$	Load Days Counter 1
(2)	$\overline{\text{LDC2}}$	Load Days Counter 2
(2)	SR0-SR9	Shift Register Outputs, Bit 0-9
(3)	CLK	100 kHz Clock
(3)	hmSC1,2,4,5	Hundredth-Millisecond Count 1,2,4,5
(3)	tmSC1,2,4,5	Tenth-Millisecond Count 1,2,4,5
(3)	mSC1,2,4,5	Millisecond Count 1,2,4,5
(3)	hSC1,2,4,8	Hundredth-second Count 1,2,4,8
(3)	tSC1,2,4,8	Tenth-second Count 1,2,4,8
(3)	ØA	Negative Edge On-Time Carrier Clock
(3)	Ø B	Positive-Edge On-Time Carrier Clock
(4)	RHC/$\overline{\text{RHC}}$	Reset Hours Counters
(4)	USC1,2,4,8	Unit Second Count 1,2,4,8
(4)	TSC1,2,4	Ten Second Count 1,2,4
(4)	UMC1,2,4,8	Unit Minute Count 1,2,4,8
(4)	TMC1,2,4	Ten Minute Count 1,2,4
(4)	UHC1,2,4,8	Unit Hour Count 1,2,4,8
(4)	THC1,2	Ten Hour Count 1,2
(4)	UDC1,2,4,8	Unit Day Count 1,2,4,8
(4)	TDC1,2,4,8	Ten Day Count 1,2,4,8
(4)	HDC1,2	Hundred Day Count 1,2
(5)	USa-g	Unit Second Segments a-g
(5)	TSa-g	Ten Second Segments a-g

Reference Number	Term Name	Definition
⑥	UMa-g	Unit Minute Segments a-g
⑥	TMa-g	Ten Minute Segments a-g
⑥	UHa-g	Unit Hour Segments a-g
⑦	THa-g	Ten Hour Segments a-g
⑦	UDa-g	Unit Day Segments a-g
⑦	TDa-g	Ten Day Segments a-g
⑦	HDa-g	Hundred Day Segments a-g
⑧	+5V 1,2,3	Plus Five Volts, Regulated
⑧	-8V	Minus Eight Volts, Unregulated
⑧	+8V	Plus Eight Volts, Unregulated
⑧	-5V	Minus 5 volts, Regulated

SECTION VII

MAINTENANCE

This unit utilizes integrated circuits. There are no moving parts or parts with limited life. There is no periodic maintenance required for the unit under normal conditions. If the unit is exposed to unusual operating conditions such as high dust or high humidity environments, or if the unit is dropped or otherwise damaged, it may be necessary to perform certain inspections and/or repairs.

If it is necessary to inspect the unit, the following should be considered:

1. Always disconnect AC power before removing the instrument cover. To remove the cover, remove the screws from the side panels and lift the cover off. (Middle screw and bottom mounting ear screw only.)

2. Make a thorough visual inspection of all circuitry and wiring.

3. Check for physical integrity of all components. Look for burned or cracked components, loose physical damage, leakage of insulation compounds or general physical damage. To aid in overall maintenance and repair, each integrated circuit is mounted in an individual modular socket. Removal or replacement is therefore convenient and easy.

   It should rarely be necessary to replace an integrated circuit; however, if replacement is attempted, be sure that all component leads enter the socket and that no leads are bent under the component or extended out from the socket.

Check to see that all IC's are firmly mounted in the socket so that good electrical contact is made.

4. Check all switches and connectors for loose or broken wires.

5. If the internal component surfaces and components have an excessive amount of dust deposited on them, use a soft brush and a low pressure stream of air to remove any foreign material.

> CAUTION
>
> Do not clean PC boards or small internal components with a stiff brush or solvents since damage to the circuits may result. A high powered vacuum cleaner device should not be used on small internal components.

6. Wipe the external surfaces of the instrument with a soft damp cloth to remove dirt, fingerprints and other foreign material.

7. Replace the cover and reconnect the AC power and input connector. Check operation. If performance does not match or exceed the specifications listed, corrective maintenance is in order.

Printed Circuit Board Repair

Removal and insertion of IC components can be easily made as described above. Should it be necessary to replace conventional components which are soldered to the circuit board, cut the leads of the part near the lead holes. Using a low power (50 watts or less) soldering iron, apply heat sparingly to each cut lead. As soon as the solder melts, slip the lead from the hole and clean the hole with a toothpick. Clean the board surfaces with isopropyl alcohol. Form the tinned leads of the replacement part and insert in

cleaned holes, trimming the leads to extend 1/16 inch beyond the back surface of the board. Only 63/37 solder with a maximum diameter of 1/16 inch should be used. Solder the leads to the board and use a hemostat, long nosed pliers, or other heat sink on the leads of all semiconductor devices and quarter-watt resistors. Allow the soldered junction to cool before removing the heat sink.

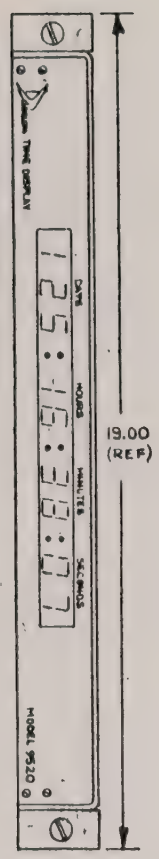
> WARNING
>
> Dangerous high voltages are present in the unit. Use caution at all times when the protective cover is removed.

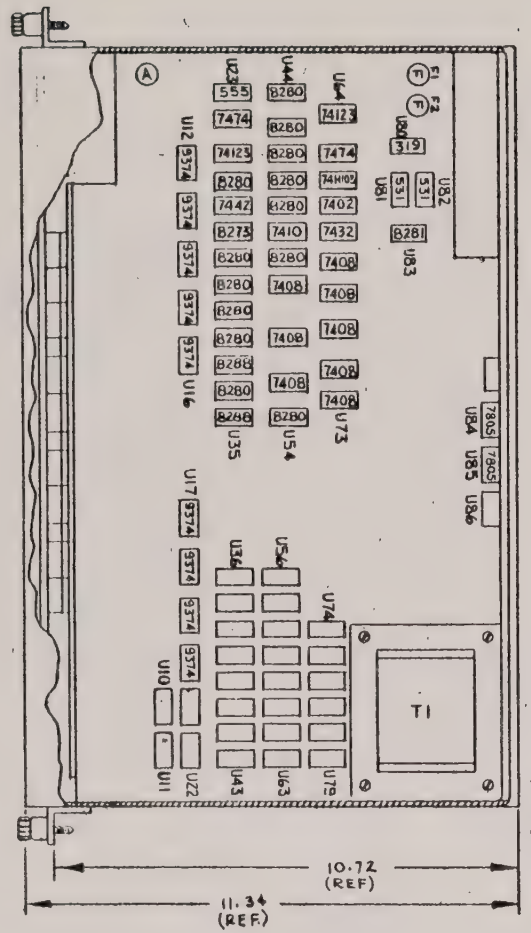
SECTION VIII

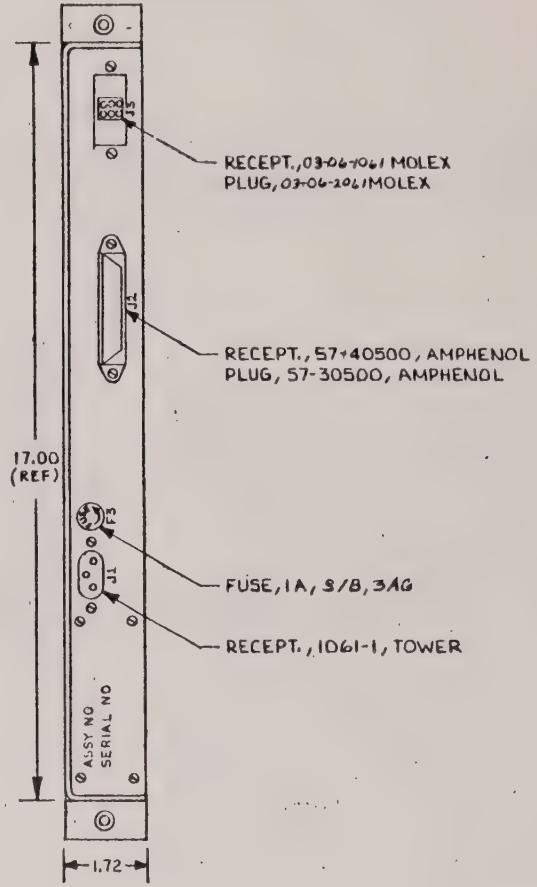
LIST OF DRAWINGS

Top Assembly Drawing	9520-100
Serial Display (1) (9)	16840

LTR	DESCRIPTION	DATE	APPROVED







J1 A.C. POWER INPUT.
J2 PARALLEL OUTPUTS
3. J3 CODE INPUT (IRIG B)

2. Ⓐ 16840-1 DISPLAY ASSY
1. TOP COVER REMOVED FOR CLARITY

NOTES: UNLESS OTHERWISE SPECIFIED

THIS DATA IS CONFIDENTIAL TO DATUM, INC. AND SHALL NOT BE REPRODUCED OR USED FOR ANY PURPOSE EXCEPT TO THE EXTENT PROVIDED BY CONTRACT.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL: .XX ± .010 .XXX ± .005 ANGLES ± 1/2°

TITLE: TIME DISPLAY

DWN CARY 10/1/14 DES

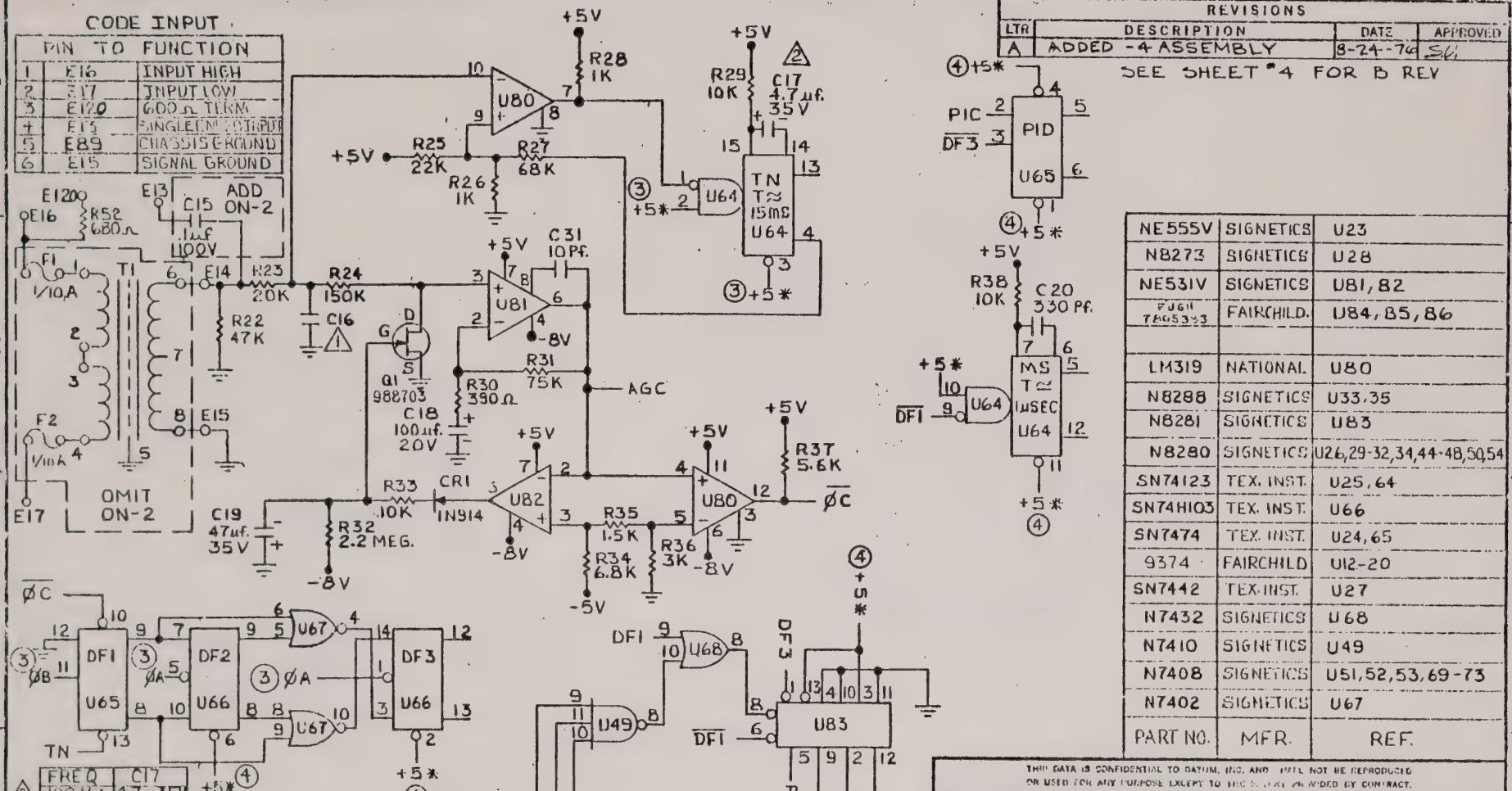
CHK ENGR

SCALE NONE FSC 31160

Datum inc.
1363 S. STATE COLLEGE BLVD.
ANAHEIM, CALIFORNIA 92806

C 9520-100

SIZE SHT 1 OF 1 REV



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	ADDED -4 ASSEMBLY	8-24-76	SK

SEE SHEET #4 FOR B REV

NE555V	SIGNETICS	U23
N8273	SIGNETICS	U28
NE531V	SIGNETICS	U81, 82
FUGH TBG533	FAIRCHILD.	U84, 85, 86
LM319	NATIONAL	U80
N8288	SIGNETICS	U33.35
N8281	SIGNETICS	U83
N8280	SIGNETICS	U26,29-32,34,44-48,50,54
SN74123	TEX. INST.	U25, 64
SN74H103	TEX. INST.	U66
SN7474	TEX. INST.	U24, 65
9374	FAIRCHILD	U12-20
SN7442	TEX. INST.	U27
N7432	SIGNETICS	U68
N7410	SIGNETICS	U49
N7408	SIGNETICS	U51, 52, 53, 69-73
N7402	SIGNETICS	U67
PART NO.	MFR.	REF.

FREQ	C17
100 HZ	4.7 @ 35V
FREQ	C16
10KHZ	220Pf
1KHZ	.0022μf
100HZ	.022μf

-5 OMIT U51, 69, & 70
-4 PAR. OUTPUTS OMITTED
-3 ADD U86, C9
-2 OMIT T1, F1, F2; ADD C15
2. -1 DAYS OPTION

NOTES: UNLESS OTHERWISE SPECIFIED

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: .XX ±.03 .XXX ±.010 ANGLES ±1/2°

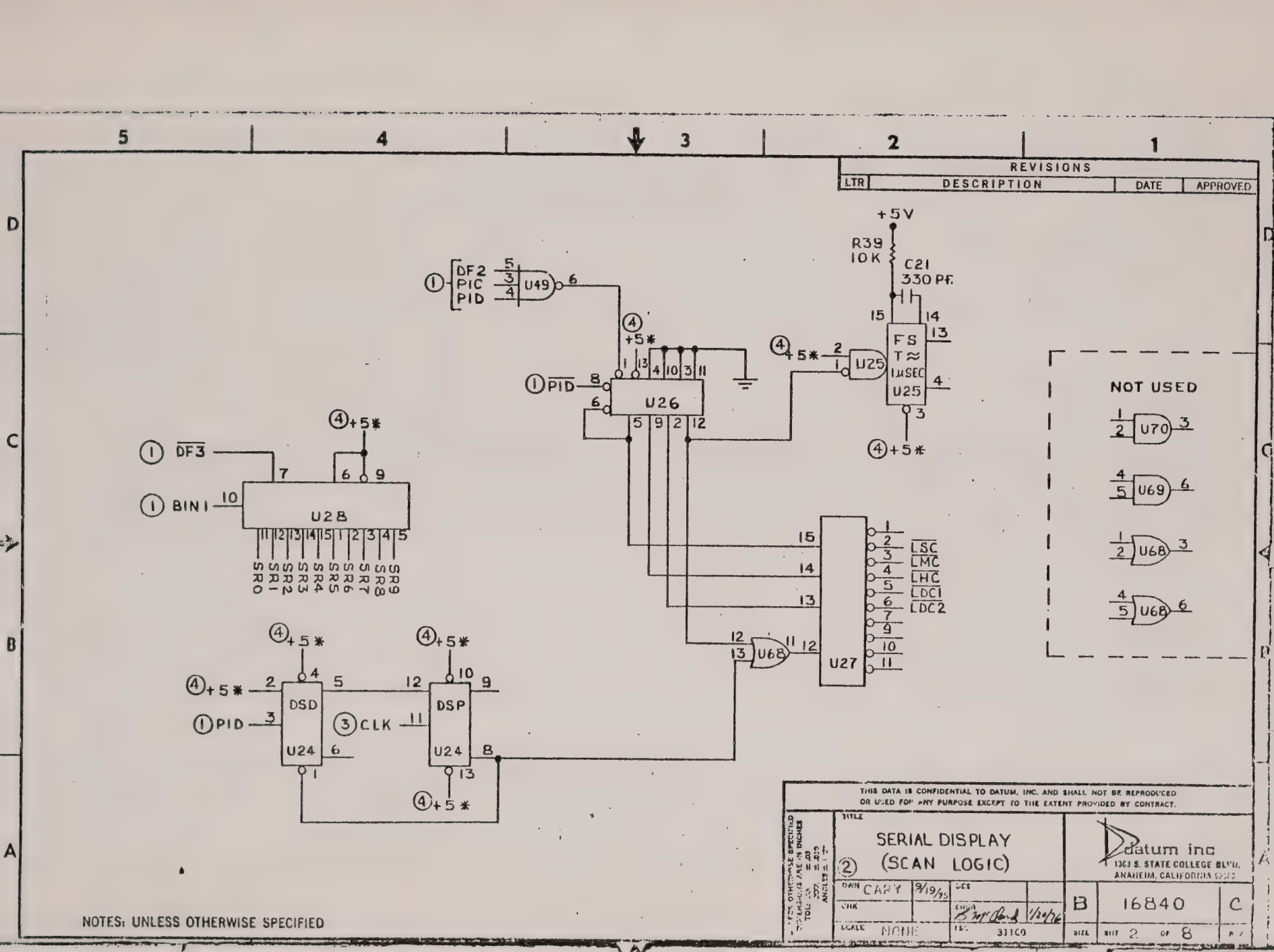
TITLE: SERIAL DISPLAY (AGC & DECODER) (1)

DRN CARY 9/9/75 | CHK | ENGR | MFG 51160 | SCALE NONE

datum inc. 1363 S. STATE COLLEGE BLVD ANAHEIM, CALIFORNIA 92806

B | 16840 | C

SIZE | SHT 1 OF 8 | REV


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
+5V
R39
10K
C21
330 PF
DF2
PIC
PID
U49
+5*
PID
U26
FS
T≈
1μSEC
U25
DF3
BIN1
U28
SR0
SR1
SR2
SR3
SR4
SR5
SR6
SR7
SR8
SR9
LSC
LMC
LHC
LDC1
LDC2
U27
U68
DSD
DSP
U24
CLK
NOT USED
U70
U69
U68
U68
NOTES: UNLESS OTHERWISE SPECIFIED
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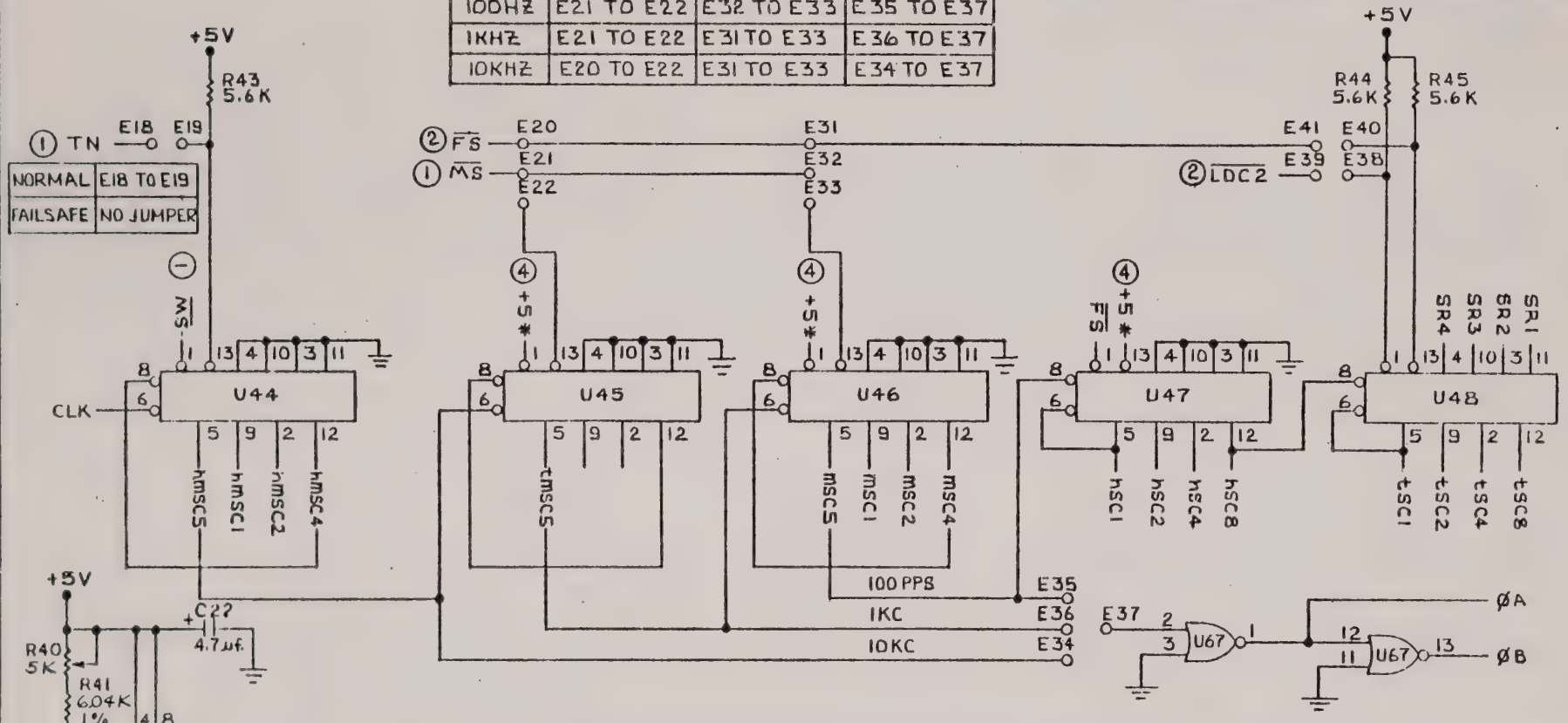
TITLE
SERIAL DISPLAY
(SCAN LOGIC)
datum inc
1363 S. STATE COLLEGE BLVD.
ANAHEIM, CALIFORNIA 92806
DWN CARY 9/19/75
CHK
ENGR 1/30/76
LOCALE NONE
MFG 3110
B
16840
C
SHT 2 OF 8

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

CARRIER FREQUENCY SELECT			
100HZ	E21 TO E22	E32 TO E33	E35 TO E37
1KHZ	E21 TO E22	E31 TO E33	E36 TO E37
10KHZ	E20 TO E22	E31 TO E33	E34 TO E37



CODE FORMAT SELECT			
IRIG A	E23 TO E24	E27 TO E28	E38 TO E39
IRIG B	E23 TO E24	E27 TO E28	E40 TO E41
IRIG E	E23 TO E24	E29 TO E30	E40 TO E41

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL .XX ± .03 .XXX ± .010 ANGLES ± 1/2°

TITLE
SERIAL DISPLAY
③ (MINOR TIME CTR)

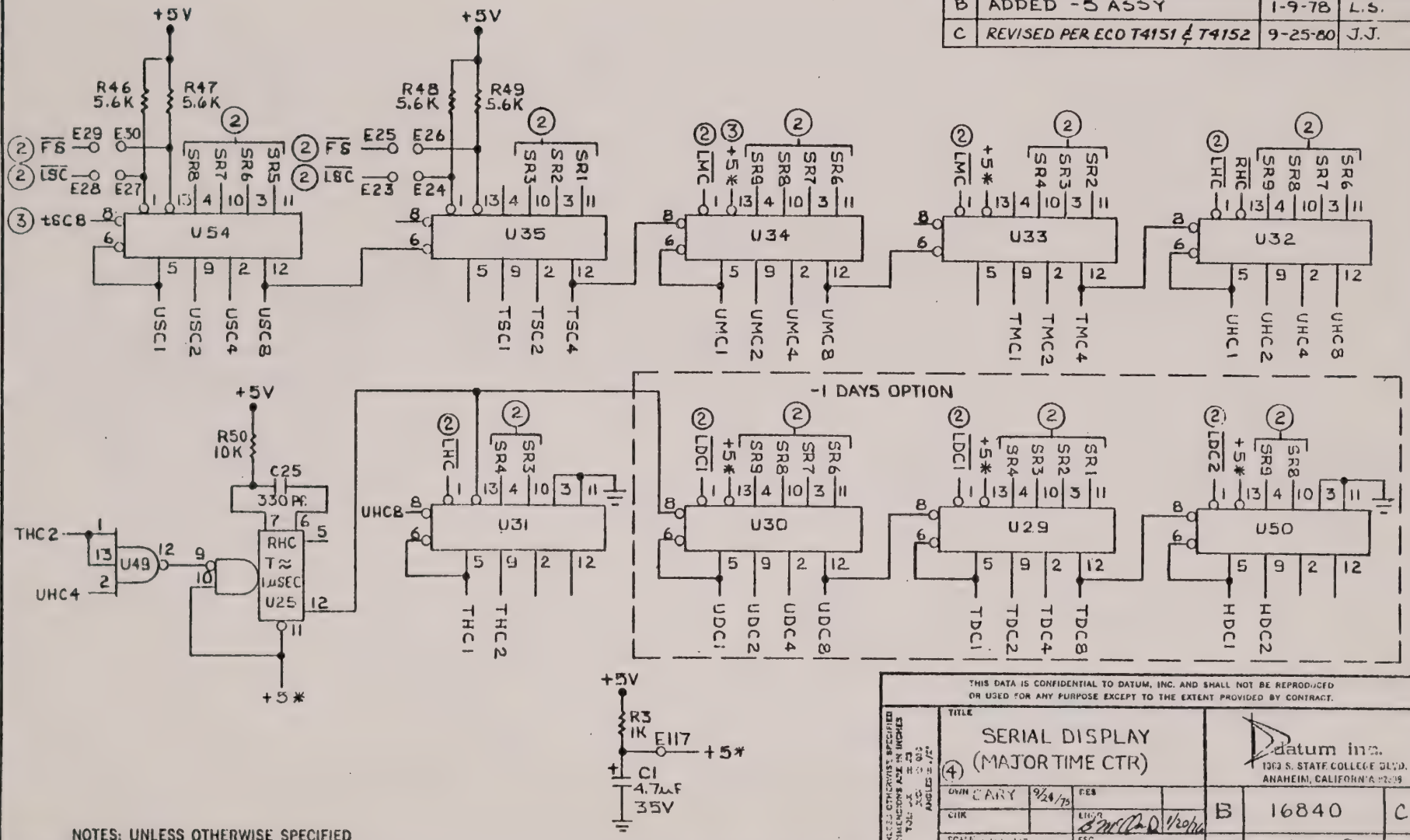
datum inc.
1363 S. STATE COLLEGE BLVD.
ANAHEIM, CALIFORNIA 92806

DWN	CARY	9/21/73	DES		
CHK			ENGR		9/20/73
SCALE	NONE		FSC	31160	

B 16840 C

SIZE B SHT 3 OF 8 REV

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
B	ADDED -5 ASSY	1-9-78	L.S.
C	REVISED PER ECO T4151 & T4152	9-25-80	J.J.



NOTES: UNLESS OTHERWISE SPECIFIED

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: FRACTIONS ±1/32 ANGLES ±1°

TITLE: SERIAL DISPLAY (MAJOR TIME CTR)

④

DWN CARY	9/24/75	ENG	
CHK		MFG	
SCALE NONE		FSC 31160	

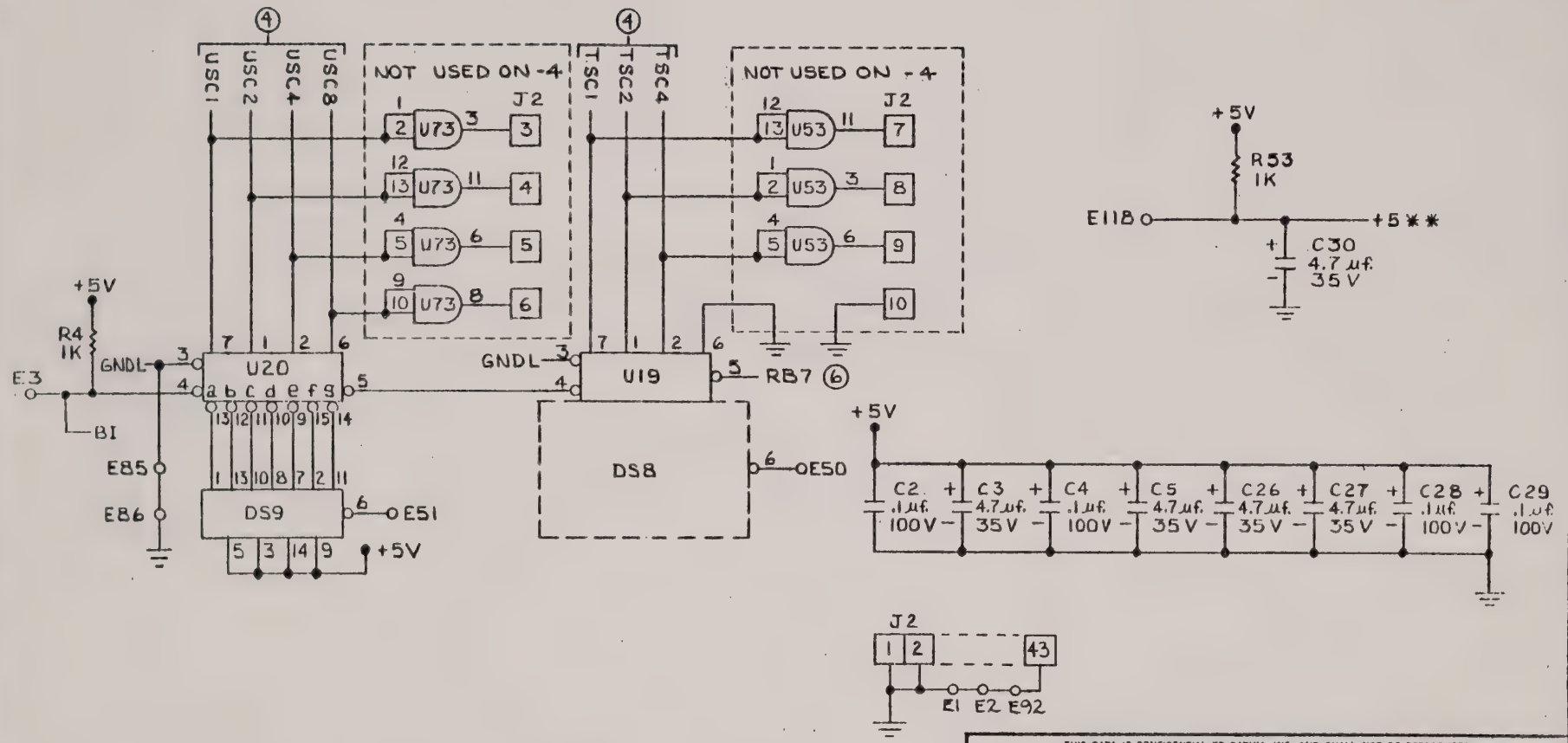
datum inc. 1363 S. STATE COLLEGE BLVD. ANAHEIM, CALIFORNIA 92806

B | 16840 | C

SIZE | SHT 4 OF 8

DATAGEN [illegible] E

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



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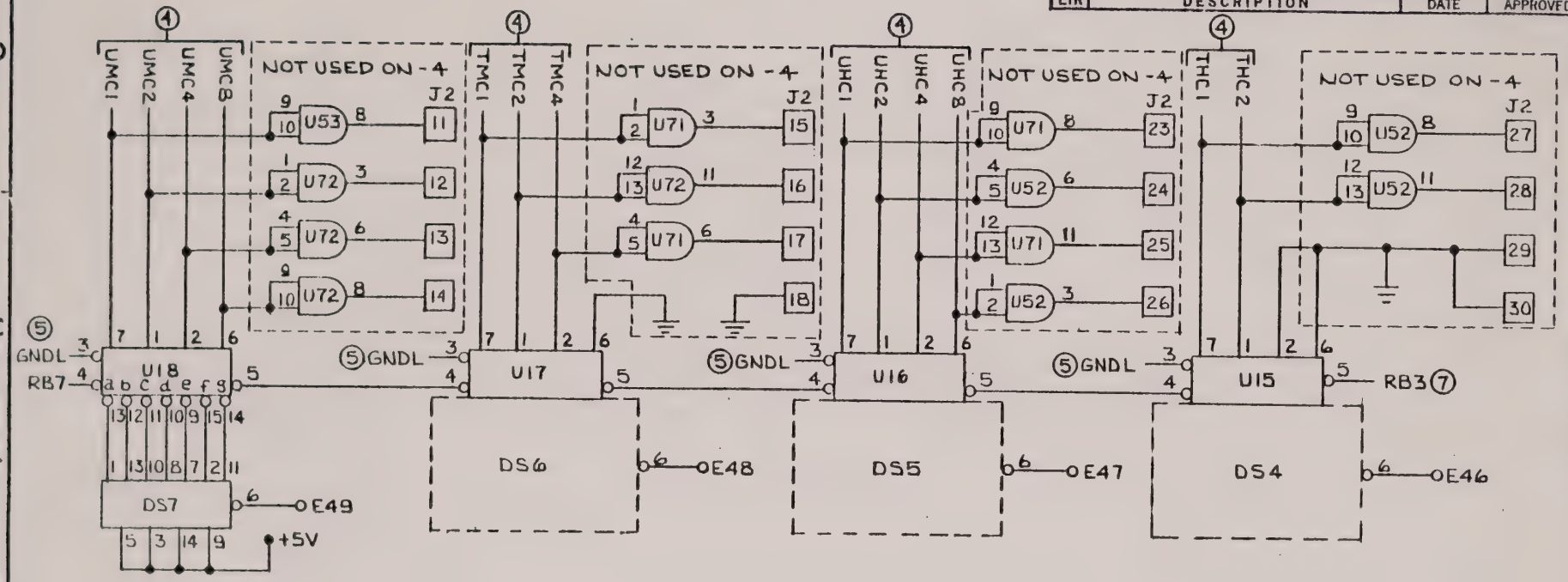
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL .XX ± .010 .XXX ± .005 ANGLES ± 1/2°

TITLE: SERIAL DISPLAY (DISPLAY DRIVERS) ⑤

DWN CARY	9/24/79	DES	
CHK		ENGR Bob Ard	11/21/79
SCALE NONE		MFG 31160	

datum inc. 1363 S. STATE COLLEGE BLVD ANAHEIM, CALIFORNIA 92806

B	16840	C
SIZE	SHT 5 OF 8	REV



NOTES: UNLESS OTHERWISE SPECIFIED

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TITLE: SERIAL DISPLAY (DISPLAY DRIVERS) (6)

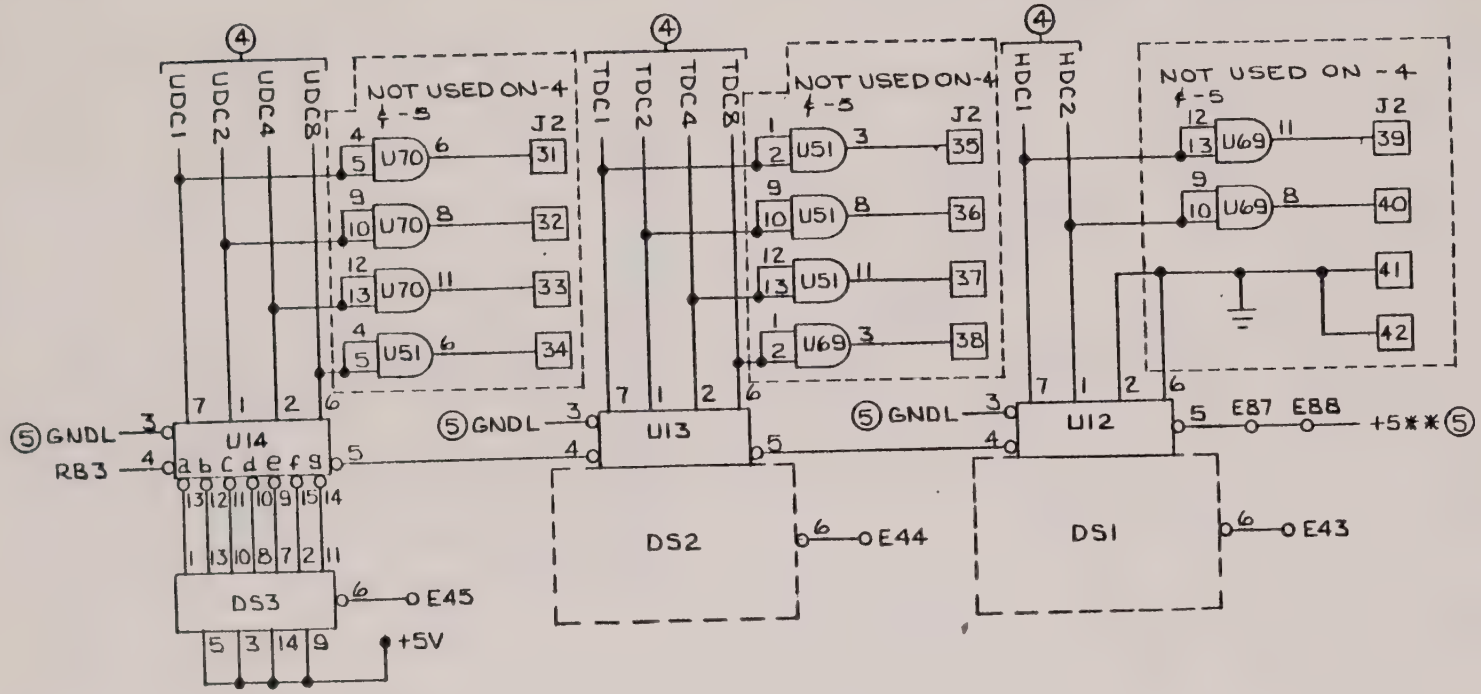
DWN CARY 9/30/75 | DES | ENGR 1/29/76 | CHK | SCALE NONE | FSC 31160

datum inc. 1363 S. STATE COLLEGE BLVD. ANAHEIM, CALIFORNIA 92805

B | 16840 | C

SIZE | SHT 6 OF 8

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



-1 DAYS OPTION

NOTES: UNLESS OTHERWISE SPECIFIED

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL: XX ± .03 XXX ± .010 ANGLES ± 1/2°

TITLE: SERIAL DISPLAY (DISPLAY DRIVERS) (7)

DWN CARY 9/30/75 DES

CHK ENGR 11/20/75

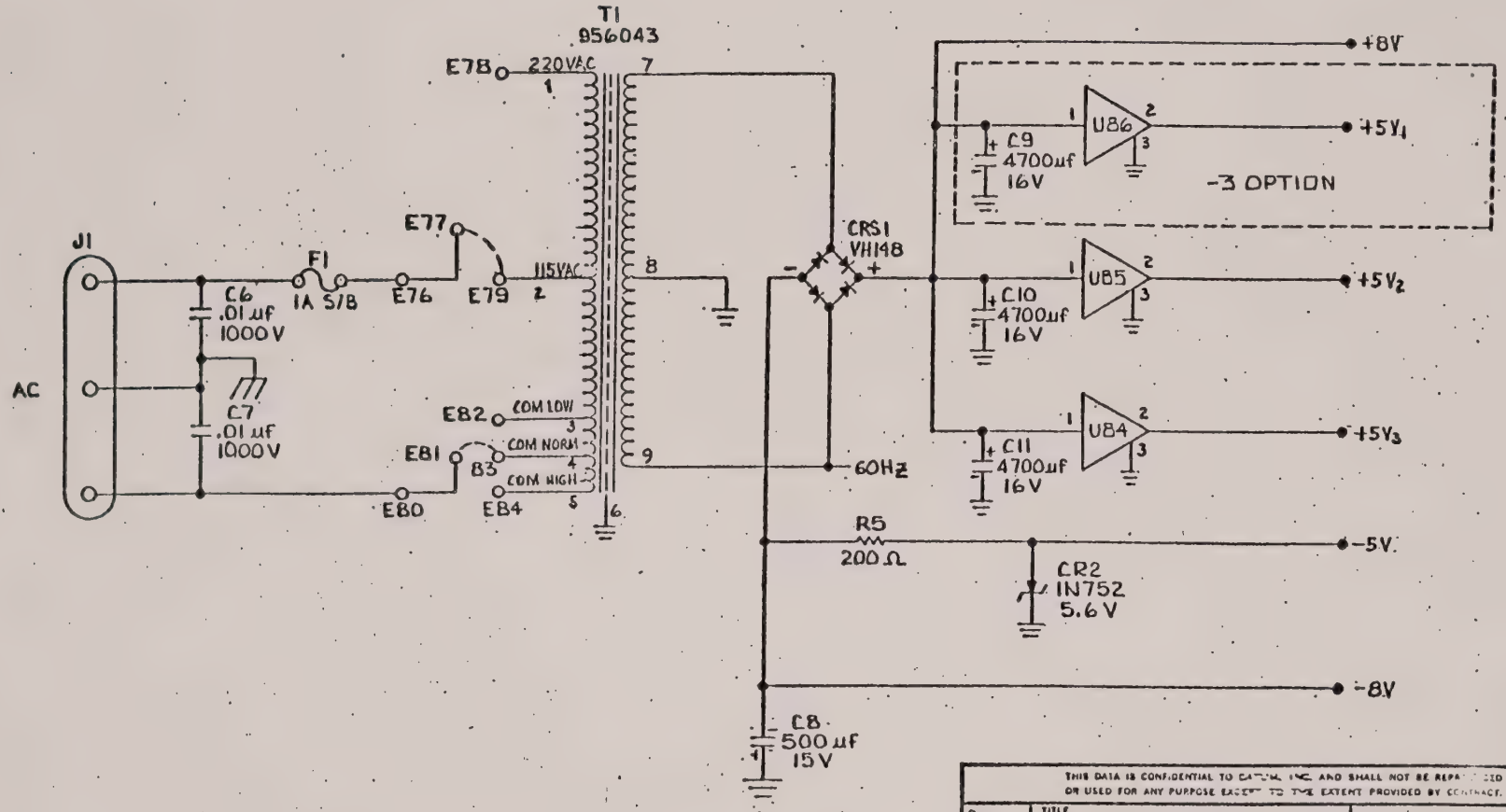
SCALE NONE FSC 31160

datum inc.
1363 S. STATE COLLEGE BLVD.
ANAHEIM, CALIFORNIA 92806

B 16840 C

SIZE SHT 7 OF 8 REV

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



NOTES: UNLESS OTHERWISE SPECIFIED

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: X ± .03, XX ± .010, XXX ± .005, ANGLES ± 1/2°

TITLE
SERIAL DISPLAY
(POWER SUPPLY)
(8)

DRN	BLS	9/19/75	DES
CHK			
SCALE	NONE		FSCM 31560

Datum Inc
1363 S. STATE COLLEGE BLVD
ANAHEIM, CALIFORNIA

SIZE	DWG NO	REV
B	16840	C

SHT 8 OF 8

SECTION IX

LIST OF MATERIALS

Time Display	9520-100
Display Assembly	16840-1

DATE: 10-27-75
DRAWN: R. FLOCK
CHK:

MATERIAL LIST

datum inc.

TITLE: TIME DISPLAY

JOB NO:
QUANTITY:
REV
ASS'Y NO: 9520-100
SHT 1 OF 1

ITEM	STOCK/PART NO.	DESCRIPTION	MFR./SPEC	QTY.	REF. DES.	UNIT COST	LOT TOTAL
1	16840-1	DISPLAY ASSY	DATUM	1			
2							
3	SK 9520-100	SHIPPING KIT	"	1			
4							
5	705672	TOP COVER STK	"	1			
6	705673	BOTTOM COVER STK	"	1			
7	705675	MTG BKT STK	"	2			
8	705674	LENS STK	"	1			
9	705669	FRONT PANEL STK	"	1			
10							
11	2325-2005	FASTENER	"	2			

NOTES:

DATE: 9-25-75
DRAWN: R. FLOCK
CHK:

MATERIAL LIST

datum inc.

JOB NO:
QUANTITY:
REV C

TITLE: DISPLAY ASSY

ASS'Y NO: 16840-1
SHT 1 OF 4

ITEM	STOCK/PART NO.	DESCRIPTION	MFR/SPEC	QTY.	REF. DES.	UNIT COST	LOT TOTAL
1	0102-0201	RESISTOR, 200Ω, 1/4w, 5%	DATUM	1	R5		
2	" -0391	" 390Ω " "	"	1	R30		
3	" -0681	" 680Ω " "	"	1	R52		
4	" -0102	" 1K " "	"	5	R3,4,26,28,53		
5	" -0152	" 1.5K " "	"	1	R35		
6	" -0302	" 3K " "	"	1	R36		
7	" -0562	" 5.6K " "	"	8	R37, 43-49		
8	" -0682	" 6.8K " "	"	1	R34		
9	" -0103	" 10K " "	"	5	R29,33,38,39,50		
10	" -0203	" 20K " "	"	1	R23		
11	" -0223	" 22K " "	"	1	R25		
12	" -0473	" 47K " "	"	1	R22		
13	" -0683	" 68K " "	"	1	R27		
14	" -0753	" 75K " "	"	1	R31		
15	" -0154	" 150K " "	"	1	R24		
16	" -0225	" 2.2MEG " "	"	1	R32		
17							
18	0115-1001	" 1K " 1%	"	1	R42		
19	" -6041	" 6.04K " "	"	1	R41		
20	0150-5001-1	POT 5K	"	1	R40		
21							
22	0201-0821	CAPACITOR 820pf CH20	"	1	C23		
23	0212-0222	" .0022uf@100V	"	1	C16		
24	0219-0478	" 4700uf@16V	"	2	C10,11		
25	" -0507	" 500uf @ 15V	"	1	C8		
26	0220-0107-1	" 100uf @ 20V	"	1	C18		

NOTES:

DATE: 9-25-75
DRAWN: R. FLOCK
CHK:

MATERIAL LIST

Datum inc.

JOB NO:
QUANTITY:
REV: C

TITLE: DISPLAY ASSY
ASS'Y NO: 16840-1
SHT 2 OF 4

ITEM	STOCK/PART NO.	DESCRIPTION	MFR/SPEC	QTY.				REF. DES.	UNIT COST	LOT TOTAL
27	0220-0475	CAPACITOR 4.7 uf @ 35V	DATUM	8				C1,3,5,17,22,26,27,30		
28	" -0476	" 47 uf "	"	1				C19		
29	0225-0331	" 330 pf @ 100V	"	3				C20,21,25		
30	0226-0103	" .01 uf @ 1000V	"	2				C6,7		
31	" -0103-1	" .01 uf @ 100V	"	1				C24		
32	" -0104	" .1 uf @ 10V	"	4				C2,4,28,29		
33	" -0100	" 10 pf @ 500V	"	1				C31		
34										
35	0301-0531-1	I.C. NE531V	"	2			Δ	U81,82		
36	" -0555	" NE555V	"	1			Δ	U23		
37	" -7H03	" SN74H103N	"	1				U66		
38	" -7123	" SN74123N	"	2			*	U25,64		
39	" -7402	" N7402A	"	1				U67		
40	" -7408	" N7408A	"	8				U51-53,69-73		
41	" -7410	" N7410A	"	1				U49		
42	" -7432	" N7432A	"	1				U68		
43	" -7442	" N7442B	"	1			*	U27		
44	" -7474	" SN7474N	"	2				U24,65		
45	" -7805	" 7805UC	"	2				U84,85		
46	" -8273	" N8273B	"	1			*	U28		
47	0301-8280	" N8280A	"	13				U26,29-32,34, 44-48,50,54		
48	" -8281	" N8281A	"	1				U83		
49	" -8288	" N8288A	"	2				U33,35		
50	" -9319	" LM319D	"	1				U80		
51	" -9374	" 9374DC	"	9			*	U12-20		

NOTES:

DATE: 9-25-75
DRAWN: R. FLOCK
CHK:

MATERIAL LIST

datum inc.

JOB NO:
QUANTITY:
TITLE: DISPLAY ASSY
ASS'Y NO: 16840-1
REV C
SHT 3 OF 4

ITEM	STOCK/PART NO.	DESCRIPTION	MFR/SPEC	QTY.				REF. DES.	UNIT COST	LOT TOTAL	
52	0500-0306	DIODE 1N914A	DATUM	1				CR1			
53	0515-0752-1	" 5.6V 1N752A	"	1				CR2			
54	0540-0148	BRIDGE RECTIFIER VH143	"	1				CR$1			
55	0570-8703	TRANSISTOR 988703	"	1				Q1			
56	0601-6140	TRANSFORMER 956140	"	1				T1			
57	" -6043	" 956043	"	1				T2			
58	0702-0010	FUSE 1A 3AG S/B	"	1				F3			
59	0703-0010	" -1A GMW	"	2				F1,2			
60	0750-0200	FUSEPOST	"	1							
61											
62	1704-0050	RECEPT 50P	"	1							
63	" -1061-1	" AC	"	1							
64	" -1625-6R	" 6P	"	1							
65	1708-0036	HEADER	"	3							
66	" -3270-1	COMP SKT	"	4							
67	" -2034	SKT 8P	"	3				△			
68	" -3897	" 14P W/W	"	31							
69	" -3898	" 16P "	"	13				✱			
70	" -3788	" 14P	"	9				⊕			
71	1792-1561	"	"	6							
72	2205-0006	NUMERIC DISPLAY	"	9				⊕ DS1-9			
73											
74	2310-1591-B	MTG BLOCK	"	2							
75	" -1300-15	SPACER	"	2							
76											
77	703806	XFORM MTG BAR STK	"	2							

NOTES:

DATE: 9-25-75
DRAWN: R. FLOCIC
CHK:

MATERIAL LIST

datum inc.

JOB NO:
QUANTITY:

REV C

TITLE: DISPLAY ASSY

ASS'Y NO: 16840-1

SHT 4 OF 4

ITEM	STOCK/PART NO.	DESCRIPTION	MFR/SPEC	QTY.	REF. DES.	UNIT COST	EXT TOTAL
78							
79	705670	REAR PANEL STK	DATUM	1			
80	705671-1	RT. SIDE BAR STK	"	1			
81	705671-2	LFT " " STK	"	1			
82							
83	705719	BUTCH PLATE STK	"	1			
84	171193 A	P.C. BD. DISPLAY STK	"	1			
85	171192 B	P.C. BD. MAIN STK	"	1			

NOTES:

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